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10/599,474

02/20/2007

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EXAMINER

YEE, DEBORAH

ART UNIT

PAPER NUMBER

1793

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/599,474 | Applicant(s) FAULKNER, ROY | |
| | Examiner Deborah Yee | Art Unit 1793 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 39-61 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 39-61 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/09/07</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 60 and 61 provides for the use of hafnium as an ingredient in a chromium steel to reduce creep or increase corrosion resistance, but, since the claims do not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 60 and 61 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

3. Claims 45, 46, 48 and 53 to 55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claims 45 and 46 recite "particle size" yet there is no antecedent basis in parent claim 39. It is recommended to use language such as --in which said hafnium carbide has an average particle size---.

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5. Claim 47 is indefinite because it recites "hafnium is substantially only present in a surface layer" yet parent claim 39 recites "hafnium...is present as hafnium carbide".
6. Claim 48 recites "surface layer" yet there is no antecedent basis in parent claim 39.
7. Claims 53 to 55 are indefinite because they recite "hafnium is substantially only present in a surface layer" yet parent claim 52 recites "hafnium...is present as hafnium carbide".

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 39 to 41, 44, 49, 52 and 56 are rejected under 35 U.S.C. 102 (b) as being anticipated by Japanese patents 10-60527 ("JP-527").
10. Similar to present invention, JP-527 in table 1 on page 8 discloses steel example 16 having a composition comprising 16% Cr- 0.20%Hf—0.30% C whereby substantially all the carbon is present and stoichiometrically equal to the proportion of hafnium as hafnium carbide; and does not contain $M_{23}C_6$ and is made into a heat treated product.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 42, 43, 45, 46, 50, 51, 57 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese patents 10-60527 ("JP-527").

13. The English abstract and claim 1 on page 2 teaches a chromium steel alloy including 0.1 to 3 wt% hafnium (overlaps claimed Hafnium range of 0.5 to 1.0 atomic%) and carbon, in which the relative proportions of hafnium and carbon are such that substantially all of the carbon is present as hafnium carbide with an average particle size of $\leq 0.2 \mu\text{m}$ equivalent to 200 nanometers (overlaps with $< 90 \text{ nm}$ and $< 50 \text{ nm}$ in respective claims 45 and 46).

14. Also according to paragraph [0080] of JP-527, steel is processed by heat treating at 500-950°C for 0.5 to 2 hours which overlaps with Applicant's range of 700-760°C for 1 to 2 hours in claims 50, 51, 57 and 58.

15. Note that the prior art range limitations overlap and therefore suggest and teach a portion of those recited by the claims.

16. Claims 39 to 46, 49 to 52, 54 to 58, 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,827,755 ("Taguchi").

17. Taguchi in claims 1 to 10 in columns 15 and 16 discloses a chromium steel alloy that can include not more than 10 wt% Hf (overlaps claimed Hf range of 0.5 to 1.0 atomic%) and carbon, in which the relative proportions of hafnium and carbon such that substantially all of the carbon can be present as hafnium carbide with an average particle size of $\leq 1 \mu\text{m}$ equivalent to 1000 nanometers.

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18. The overlap in range limitations establishes a prima facie case of obviousness because it would be obvious for one skilled in the art to select the claimed ranges over the broader disclosure of the prior art since the prior art teaches the same utility of making a high corrosion resistant component.

19. More specifically, example 7 in table 8 of columns 11 and 12 discloses a chromium steel containing 1.1 wt% Hf subjected to HIP heat treatment at 700°C for 4 hours which closely meets the claimed composition and heat treatment.

20. Although Taguchi on lines 9 to 16 of column 13 teaches the presence of $M_{23}C_6$, it would not be excluded by the recitation of claim 40 "an alloy...in which substantially no amount of phase $M_{23}C_6$ is present" because the term "substantially" is general and vague with no numerical limitation.

21. In regard to claims 41 to 42, Taguchi teaches an alloy containing up to 10 wt% Hf which would suggest at least 0.5 atomic% and 0.5 to 1.0 atomic%.

22. In regard to claims 43 to 46, Taguchi teaches fine particle size of $\leq 1 \mu m$ equivalent to 1000 nanometers which overlaps recited range of $< 90 \text{ nm}$ and $< 50 \text{ nm}$.

23. In regard to claims 49 to 51, 56 and 58, Taguchi in claims 15 and 16 teaches HIP heat treatment at 600 to 1000°C followed by tempering at 200 to 700°C for 1 to 10 hours.

24. In regard to claims 60 and 61, Taguchi on lines 12 to 15 of column 1 teaches steel containing Hf as a component exhibiting corrosion resistance for corrosive and stress load application.

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25. Claims 39 to 46, 49, 52, 56, 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over European patent 1001044 ("EP-044") cited by Applicant in IDS dated August 9, 2007.

26. EP-044 in claims 1 to 9 teaches a chromium steel alloy including 0.001 to 0.2 wt% hafnium (overlaps claimed Hf range of 0.5 to 1.0 atomic%) and carbon, in which the relative proportions of hafnium and carbon are present as hafnium carbide. Similar to present invention, paragraph [0044] of EP-044 teaches "Hf has the effect of improving the long-time creep rupture strength of high-Cr steels by dissolving in the matrix to strengthen the matrix itself, retarding the aggregation and coarsening of carbides, and forming fine carbide and thereby contributing to precipitation strengthening."

27. Even though Hf carbide with an average particle size of < 90 nm and < 50nm in respective claims 45 and 46 is not taught by EP-044, such would be expected since prior art alloy closely meets the claimed composition and its fine hafnium carbides achieves the same purpose as present invention to improve creep strength.

28. More specifically, examples 61 in table 12 on page 22 and examples 72, 75, 79 and 80 in table 14 on page 24 discloses a chromium steel containing greater than 0.10% wt% Hf.

29. Although EP-044 in paragraph [0029] teaches the presence of $M_{23}C_6$, it would not be excluded by the recitation of claim 40 "an alloy...in which substantially no amount of phase $M_{23}C_6$ is present" because the term "substantially" is general and vague with no numerical limitation.

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30. In regard to claims 60 and 61, EP-044 in paragraph [0044] teaches using hafnium in Cr steel to improve creep and corrosion resistance.

31. Claims 39 to 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4,981,756 ("Rhandhawa").

32. Rhandhawa in claims 1 to 5 and 11 to 15 in column 6 discloses a Cr stainless steel wherein the surface can be coated with hafnium-based carbide by ion-implantation at a thickness of less than 3 microns and is within the claimed surface layer thickness range of up to 2 microns in dependent claims. The prior art coating of hafnium carbide can be present without any other carbide, such as $M_{23}C_6$, and contains Hf at > 0.5 atomic% and 0.5 to 1.0 atomic %.

33. Rhandhawa does not teach the size of hafnium carbide but would be expected to be within the size of less than 90 nm or less than 50 nm as recited by dependent claims since alloy is made in substantially the same manner as present invention by ion implantation.

34. Rhandhawa does not teach tempering at 700-760°C for 1 to 2 hours. Nevertheless, tempering is a conventional practice in the metallurgical to relieve stress in steel and would be obvious and a matter of choice well within the skill of the artisan to incorporate to produce no new and unexpected results.

Specification

35. The disclosure is objected to because of the following informalities: Applicant submitted Tables 1 to 4 filed September 29, 2006 with drawings but said tables are not discussed in the specification.

Appropriate correction is required.

36. The unapplied references have been cited to further depict Cr steel with Hf carbides.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Deborah Yee whose telephone number is 571-272-1253. The examiner can normally be reached on monday-friday 6:00 am-2:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Deborah Yee/
Primary Examiner
Art Unit 1793

/DY/